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Send to: Kim, Kevin	From: Mariana Paula Noli
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Comments:

Applicant: SIRF Technology, Inc.
Title: "ANALOG COMPRESSION OF GPS C/A SIGNAL TO AUDIO BANDWIDTH"
Serial No.: 09/938,459
Attorney Docket No.: ST00015USU1 (108-US-U1)

Please acknowledge receipt of the following documents:

1) Petition for Extension of Time under 37 CFR 1.136 (a) FY 2005 (1 page + copy); and
2) Credit Card Authorization in the amount of USD $450.00 (1 page); and
3) Response to Office Action mailed March 12, 2007 (13 pages).

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Total pages, including cover: 17

Comments:

Applicant: SiRF Technology, Inc.
Title: "ANALOG COMPRESSION OF GPS C/A SIGNAL TO AUDIO BANDWIDTH"
Serial No.: 09/938,459
Attorney Docket No.: ST00015USU1 (108-US-U1)

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PTO/SB/22 (09-06)
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PETITION FOR EXTENSION OF TIME UNDER 37 CFR 1.136(a) **FY 2006** *(Fees pursuant to the Consolidated Appropriations Act, 2005 (H.R. 4818).)*	Docket Number (Optional) ST00015USU1 (108-US-U1)
Application Number 09/938,459	Filed August 23, 2001
For Analog Compression of GPS C/A Signal to Audio Bandwidth	
Art Unit 2611	Examiner Kim, Kevin

This is a request under the provisions of 37 CFR 1.136(a) to extend the period for filing a reply in the above identified application.

The requested extension and fee are as follows (check time period desired and enter the appropriate fee below):

		Fee	Small Entity Fee	
☐	One month (37 CFR 1.17(a)(1))	$120	$60	$
☒	Two months (37 CFR 1.17(a)(2))	$450	$225	$ 450.00
☐	Three months (37 CFR 1.17(a)(3))	$1020	$510	$
☐	Four months (37 CFR 1.17(a)(4))	$1590	$795	$
☐	Five months (37 CFR 1.17(a)(5))	$2160	$1080	$

☐ Applicant claims small entity status. See 37 CFR 1.27.

☐ A check in the amount of the fee is enclosed.

☒ Payment by credit card. Form PTO-2038 is attached.

☐ The Director has already been authorized to charge fees in this application to a Deposit Account.

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I am the

☐ applicant/inventor.

☐ assignee of record of the entire interest. See 37 CFR 3.71. Statement under 37 CFR 3.73(b) is enclosed (Form PTO/SB/96).

☒ attorney or agent of record. Registration Number 42,227

☐ attorney or agent under 37 CFR 1.34. Registration number if acting under 37 CFR 1.34 _____

Jeffrey C. Wilk
Signature

August 13, 2007
Date

Jeffrey C. Wilk
Typed or printed name

(818) 488-8148
Telephone Number

NOTE: Signatures of all the inventors or assignees of record of the entire interest or their representative(s) are required. Submit multiple forms if more than one signature is required, see below.

☐ Total of _____ forms are submitted.

This collection of information is required by 37 CFR 1.136(a). The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.11 and 1.14. This collection is estimated to take 6 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

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PETITION FOR EXTENSION OF TIME UNDER 37 CFR 1.136(a) FY 2006 *(Fees pursuant to the Consolidated Appropriations Act, 2005 (H.R. 4818).)*	Docket Number (Optional) ST00015USU1 (108-US-U1)
Application Number 09/938,459	Filed August 23, 2001
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☐	Four months (37 CFR 1.17(a)(4))	$1590	$795	$
☐	Five months (37 CFR 1.17(a)(5))	$2160	$1080	$

☐ Applicant claims small entity status. See 37 CFR 1.27.

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I am the

☐ applicant/inventor.

☐ assignee of record of the entire interest. See 37 CFR 3.71.
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☒ attorney or agent of record. Registration Number 42,227

☐ attorney or agent under 37 CFR 1.34.
Registration number if acting under 37 CFR 1.34 _____

Jeffrey C. Wilk
Signature

August 13, 2007
Date

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Typed or printed name

(818) 488-8148
Telephone Number

NOTE: Signatures of all the inventors or assignees of record of the entire interest or their representative(s) are required. Submit multiple forms if more than one signature is required, see below.

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PATENT
Docket No.: ST00015USU1(108-US-U1)
09/938,459

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

APPLICANT: Charles P. Norman	DOCKET NO.: ST00015USU1(108-US-U1)
SERIAL NO.: 09/938,459	GROUP ART UNIT: 2611
DATE FILED: August 23, 2001	EXAMINER: Kim, Kevin
	CONFIRMATION NO.: 2229

TITLE: ANALOG COMPRESSION OF GPS C/A SIGNAL TO AUDIO BANDWIDTH

CERTIFICATE OF TRANSMISSION
I hereby certify that this correspondence (along with any paper referred to as being attached or enclosed) is being facsimile transmitted to the United States Patent and Trademark Office, Fax No. (571) 273-8300, on August 13, 2007.

Mariana Paula Noli

August 13, 2007

Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Dear Sir:

RESPONSE TO OFFICE ACTION MAILED MARCH 12, 2007

This is responsive to the non-final Office Action mailed March 12, 2007, for which a shortened statutory period for reply expired on June 12, 2007. Applicant submits herewith a Petition for Extension of Time with the appropriate fee for extending the time to reply to August 12, 2007. Because August 12, 2007, falls on a Sunday, and the next succeeding business day is Monday, August 13, 2007, the present amendment is believed to have been timely filed under MPEP 710.05.

Claims 1-22 are currently pending in the present Patent Application. The Examiner has rejected claims 1, 12, and 13 under 35 U.S.C. § 102(b) and claims 2 and 14 under 35 U.S.C.

§ 112, first paragraph. The Examiner has also objected to claims 16 and 17 as being of improper dependent form, and claims 5-11 are allowed.

Accordingly, in order to expedite the prosecution of the present application, applicant has canceled claims 4, 13, and 16, and amended claims 1, 2, 14, and 17, and is traversing the foregoing rejections of claims 1, 12, and 13 under 35 U.S.C. § 102(b). The objections to claims 13 and 16 are now believed to be moot. Applicant has also amended claims 2 and 14 to overcome the rejection under 35 U.S.C. § 112, first paragraph, and has also amended claims 3, 7, 9, 19 and 21 to clarify the invention recited in these claims. Applicant, however, reserves the right to present the amended claims in their original form in one or more continuation applications.

Please reconsider the above-identified Patent Application in view of the Amendments and Remarks contained below. Applicant believes that no new matter has been added by these Amendments.

AMENDMENTS

TO THE CLAIMS

This listing of claims will replace all prior versions, and listings, of claims in the application:

LISTING OF CLAIMS:

1. (currently amended): A method for compressing a Global Positioning System (GPS) signal, comprising:

receiving the GPS signal from a remote location via a wireless communications link;

removing a carrier component of the GPS signal;

matching a comb filter to the GPS signal to obtain a first output signal comprising filter lines; and

frequency shifting the filter lines in the first output signal to produce a compressed GPS signal by mixing the first output signal with a plurality of outputs from at least one frequency generator.

2. (currently amended): The method of claim 1, further including the step of ~~frequency shifting~~filtering the compressed GPS signal through a bandpass filter to produce a second compressed GPS signal.

3. (currently amended): The method of claim 2, wherein the matching of the comb filter further includes:

receiving a frequency reference signal from a ~~remote location~~base station via a wireless communications link;

applying the frequency reference signal to the comb filter, wherein the frequency reference signal shifts the comb filter to an expected location of the filter lines of the first output signal.

4. (canceled).

5. (previously presented): A method for compressing a Global Positioning System (GPS) signal, comprising:

receiving the GPS signal from a remote location via a wireless communications link;

removing a carrier component of the GPS signal to produce a first resultant signal;

filtering the first resultant signal through a comb filter to produce a second resultant signal that includes a plurality of signals dispersed over a frequency spectrum;

generating a plurality of mixing signals at selected frequencies; and

mixing the second resultant signal with the plurality of mixing signals to produce a first compressed GPS signal.

6. (previously presented): The method of claim 5, further including filtering the first compressed GPS signal through a bandpass filter to produce a second compressed GPS signal.

7. (currently amended): The method of claim 6, further including:

receiving a frequency reference signal from a ~~remote location~~base station via a wireless communications link;

mixing the frequency reference signal and the first resultant signal to produce another first resultant signal; and

filtering the another first resultant signal through the comb filter to produce the second resultant signal.

8. (previously presented): The method of claim 7, wherein filtering the another first resultant signal further includes matching the first resultant signal with the second compressed GPS signal.

9. (currently amended): The method of claim 7, further including:

sending the second compressed GPS signal to [[a]]the base station via a wireless communications link.

10. (previously presented): The method of claim 9, wherein the second compressed GPS signal includes a signal identifier.

11. (previously presented): The method of claim 10, wherein the signal identifier is a Mobile Identification Number/Electronic Serial Number ("MIN/ESN").

12. (currently amended): An apparatus for compressing a Global Positioning System (GPS) signal, the apparatus comprising:

a receiver configured to receive the GPS signal from a remote location via a wireless communications link;

a first mixer coupled to the receiver, configured to remove a carrier component of the GPS signal and to produce a first resultant signal;

a comb filter, coupled to the first mixer, configured to filter the first resultant signal and to produce a second resultant signal that includes a plurality of signals dispersed over a frequency spectrum; and

a first frequency shifter configured to shift the frequencies of the plurality of signals in the second resultant signal to produce a first compressed GPS signal, the first frequency shifter comprising:

at least one frequency generator configured to generate a plurality of signals of varying frequencies; and

a plurality of second mixers, coupled to the comb filter and to the at least one frequency generator.

13. (canceled).

14. (currently amended): The apparatus of claim [[13]]12, further including a ~~second frequency shifter~~bandpass filter, coupled to the plurality of second mixers, configured to produce a second compressed GPS signal.

15. (previously presented): The apparatus of claim 12, further including:

a third mixer coupled to the receiver and to the first mixer and in signal communication with the comb filter, configured to produce the second resultant signal.

16. (canceled).

17. (currently amended): The apparatus of claim [[16]]15, further including a ~~second frequency shifter~~bandpass filter signal combiner, coupled to the plurality of second mixers, configured to produce the second compressed GPS signal.

18. (canceled).

19. (currently amended): The apparatus of claim 17, further including a transmitter coupled to the second mixer, configured to transmit the second compressed GPS signal to [[the]]a base station.

20. (previously presented): The apparatus of claim 19, further including means for identifying the second compressed GPS signal to the base station.

21. (currently amended): The method of claim 5, further including:

receiving an assist signal from a ~~remote location~~base station via a wireless communications link; and

removing telemetry data and Doppler from the first resultant signal using the assist signal.

22. (previously presented): The method of claim 9, further including:

receiving position information derived from the GPS signal from the base station.

REMARKS

STATUS SUMMARY

Claims 1–22 are pending in the present application. The Examiner has objected to claims 16 and 17 as being of improper dependent form. The Examiner has rejected claims 2 and 14 under 35 U.S.C. § 112, first paragraph, as failing to comply with the enablement requirement in that these claims contain subject matter that is not described in the specification in such a way as to enable one skilled in the art to which it pertains, or with which it is most nearly connected, to make and/or use the invention. The Examiner has also rejected claims 1, 12, and 13 under 35 U.S.C. § 102(b) as being anticipated by U.S. Patent No. 5,517,529 to *Stehlik* ("*Stehlik*"), and claims 3, 4, and 15-18 are also rejected as being dependent on a rejected claim. Claims 5-11 are allowed.

Claims 19-22 are not discussed in the Detailed Action of the pending non-final Office action. For the reasons stated below in response to the rejections under 35 U.S.C. § 102(b), applicant respectfully submits that these claims, as amended, are now allowable.

These formal matters identified in the Office Action are addressed herein below.

OBJECTIONS TO CLAIMS 16 AND 17

As for the objections to claims 16 and 17, the objection to claim 16 is now moot, claim 16 having been canceled. Applicant respectfully traverses the objection to claim 17 for the reason that claim 17 has been amended to depends on claim 15, and claim 15 depends on claim 12, not claims 13 or 14. Thus claims 12, 15, and 17 claim a separate subject matter from that

claimed by claims 12 and 14, and the same subject matter is not claimed in claims 12, 15, and 17 and claims 12 and 14.

In view of the foregoing, applicant respectfully submits that the objections to claims 16 and 17 are improper, and therefore requests that the Examiner's objections be withdrawn at this time.

CLAIM REJECTIONS - 35 U.S.C. § 112, FIRST PARAGRAPH

Claims 2 and 14 are rejected under 35 U.S.C. § 112, first paragraph, as failing to comply with the enablement requirement in that these claims contain subject matter that is not described in the specification in such a way as to enable one skilled in the art to which it pertains, or with which it is most nearly connected, to make and/or use the invention. Accordingly, applicant has amended claims 2 and 14 to overcome the lack of enablement referred to by the Examiner.

In general, these claims have been amended by replacing the term "second frequency shifter" with the term "bandpass filter." Support for this amendment may be found, for example, at page 7, lines 6-8, page 8, lines 6-8, and elsewhere throughout the specification.

In view of the foregoing, applicant respectfully submits that the rejections of claims 2 and 14 under 35 U.S.C. § 112, first paragraph, have been overcome, and requests that these rejections be withdrawn.

CLAIM REJECTIONS - 35 U.S.C. § 102(b)

Claims 1, 12, and 13 are rejected under 35 U.S.C. § 102(b) as being anticipated by *Stehlik*. Applicant has amended claims 1 and 12 to clarify the invention recited in these respective claims and canceled claim 13. Support for these amendments of claims 1 and 12 may be found, for example, at page 7, lines 5-6, FIG. 1, and elsewhere throughout the specification. Thus, no new matter has been added by these Amendments.

Applicant respectfully traverses this rejection because the cited reference fails to teach each and every feature or element recited in the rejected claims.

With respect to independent claims 1 and 12, the Examiner cites the decimation filtering and decimation means 430A that includes a pair of comb filters 460A and 462A as shown in FIG. 12 of *Stehlik*. This, however, does not teach or disclose the frequency shifting or the frequency shifter that includes a frequency generator.

Stehlik does not teach or disclose frequency shifting the filter lines in an output signal of a comb filter using signals of varying frequencies generated by an at least one frequency generator. (*See* specification, page 8, lines 3-5.) Nothing in *Stehlik* indicates the utilization of the at least one frequency generator to process the digitized signals found in *Stehlik*. Also, *Stehlik* does not disclose a plurality of mixers that uses a plurality of mixing signals at selected delays (frequencies) to compress a GPS signal because the mixers 464A and 466a are merely 2 separate single mixers for the I and Q components of a GPS signal.

In view of the foregoing, applicant respectfully submits that claims 1 and 12, as amended, are not anticipated by *Stehlik*. Therefore, applicant respectfully requests that these rejections be withdrawn.

Independent claims 1 and 12 being in condition for allowance, dependent claims 2-3, and 14, 17, 19, and 20 that depend directly or indirectly from allowable independent claims 1 and 12, respectively, are also in condition for allowance for at least the same reasons. Also, claim 21, which depends directly from allowed claim 5, and claim 22, which depends indirectly from allowed claim 5, are also allowable.

CLAIM AMENDMENTS

Claims 3, 7, 9, 19, and 21 have been amended to clarify the invention recited in these claims. Support for these amendments of claims 3, 7, 9, 19, and 21 may be found, for example, at page 6, lines 19-21, and elsewhere throughout the specification.

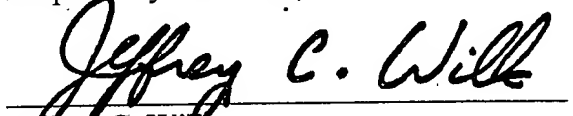
No new matter has been added by these Amendments. Additionally, applicant reserves the right to present the amended claims in their original form in one or more continuation applications.

CONCLUSION

In light of the above amendments and remarks, it is respectfully submitted that the present application is now in proper condition for allowance, and an early notice to such effect is earnestly solicited.

If any small matter should remain outstanding after the Patent Examiner has had an opportunity to review the above Remarks, the Patent Examiner is respectfully requested to telephone the undersigned patent attorney in order to resolve these matters and avoid the issuance of another Official Action.

Respectfully submitted,

Date: August 13, 2007 By: 

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FORM PTO-1449 U.S. Department of Commerce Patent and Trademark Office List of Documents Cited by Applicant	Attorney Docket No.: ST00015USU2 (108-US-U2)	Serial No.: 09/938,387
	Applicant(s): Charles P. Norman	
	Filing Date: 8/23/2001	Group: 2631

U.S. PATENT DOCUMENTS

Examiner Initial	No.	Document Number	Date	Name	Class	Subclass	Filing date if Appropriate
	01	5,663,734	09/02/1997	Krasner			
	02	5,663,735	09/02/1997	Eshenbach			
	03	5,781,156	07/14/1998	Krasner			
	04	5,812,087	09/22/1998	Krasner			
	05	5,825,327	10/20/1998	Krasner			
	06	5,831,574	11/03/1998	Krasner			
	07	5,841,396	11/24/1998	Krasner			
	08	5,874,914	02/23/1999	Krasner			
	09	5,884,214	03/16/1999	Krasner			
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	11	5,999,124	12/07/1999	Sheynblat			
	12	6,002,363	12/14/1999	Krasner			
	13	6,104,338	08/15/2000	Krasner			
	14	6,104,340	08/15/2000	Krasner			
	15	6,107,960	08/22/2000	Krasner			
	16	6,016,119	01/18/2000	Krasner			
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	19	6,064,336	05/16/2000	Krasner			
	20	6,111,540	08/29/2000	Krasner			
	21	6,131,067	10/10/2000	Girerd			
	22	6,133,871	10/17/2000	Krasner			
	23	6,133,873	10/17/2000	Krasner			
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	25	6,150,980	11/21/2000	Krasner			
	26	6,185,427	02/06/2001	Krasner			
	27	6,208,290	03/27/2001	Krasner			
	28	6,208,291	03/27/2001	Krasner			
	29	6,215,441	04/10/2001	Moeglein			
	30	6,215,442	04/10/2001	Sheynblat			
	31	6,236,354	05/22/2001	Krasner			
	32	6,239,742	05/29/2001	Krasner			
	33	6,259,399	07/10/2001	Krasner			
	34	6,272,430	08/07/2001	Krasner			
	35	6,289,041	09/11/2001	Krasner			
	36	6,307,504	10/23/2001	Sheynblat			
	37	6,313,786	11/06/2001	Sheynblat			
	38	6,314,308	11/06/2001	Sheynblat			
	39	6,377,209	04/23/2002	Krasner			
	40	6,408,196	06/18/2002	Sheynblat			
	41	6,411,254	06/25/2002	Moeglein			
	42	6,411,892	06/25/2002	Van Diggelen			
	43	6,417,801	07/09/2002	Van Diggelen			

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FOREIGN PATENT DOCUMENTS

		Document Number	Date	Country	Name of Patentee or Applicant	Translation Yes | No

OTHER DOCUMENTS (Including Author, Title, Date, Pertinent Pages, Etc.)

	54	Marketing Material: Qualcomm CDMA Technologies – Integrated Solutions -- MGP6200™ Multimode GPS Processor (8 pages)

	55	Marketing Material: uNav Microelectronics – uN9x18 Low Power, High Performance GPS Receiver Chipset/uN9x18 GPS Receiver Solution (9 pages)
	56	Marketing Material: uNav Microelectronics, uN9x18 Low Power, High Performance GPS Receiver Chipset (2 pages)
	57	Marketing Material: Global Locate -- Hammerhead II™, Single Chip AGPS Solution (2 pages)
	58	Marketing Material/Press Release: Broadcom Introduces Advanced Single-Chip GPS Solution for Mobile Applications (3 pages)
	59	Marketing Material/White Paper: SnapTrack: A Qualcomm Company – SnapTrack's Wireless Assisted GPS™ (A-GPS) Solution Provides the Industry's Best Location System – Location Technologies for GSM, GPRS and WCDMA Networks (Qualcomm CDMA Technologies: Enabling the Future of Communications) (4 pages)

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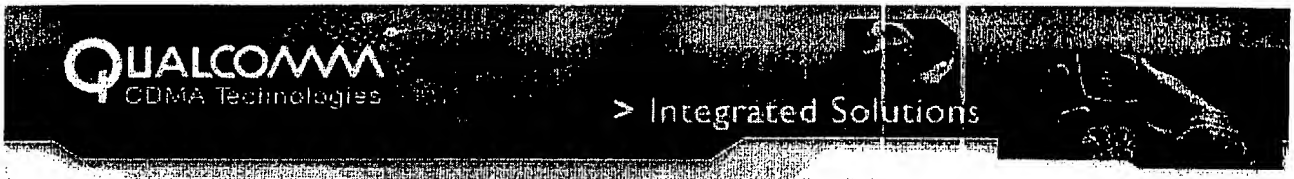

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> MGP6200™ Multimode GPS Processor

QCT's MGP6200™ (Multimode GPS Processor) chipset is optimized for the QUALCOMM MSM6200™ Mobile Station Modem (MSM™) solution to enable Assisted GPS (AGPS) operation and standalone GPS operation. The MGP6200 solution supports AGPS-based location applications on GSM, GPRS and WCDMA (UMTS), and supports roaming across diverse service areas, seamlessly switching between modes to utilize available aiding information. It does not require costly network equipment, such as location measurement units (LMUs), to operate effectively.

Compelling advantages over other location technologies include low-cost implementation, crisp AGPS operation in asynchronous networks and three different modes of operation to address different application requirements. Ranging from full-featured mobile-assisted to unassisted standalone operation, the MGP6200 can optimize the location solution for periodic or continuous position reports, or even for applications where no assistance data is available from the wireless network.

Through QUALCOMM's Wireless Internet Launchpad suite, the position location component provides mobile e-commerce and wireless Internet applications with easy access to location information and control over their operation. Leading-edge algorithms and a high level of integration provide unmatched GPS acquisition speed, accuracy and sensitivity. At the same time, handset costs, space requirements and battery usage are minimized.

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MULTIMODE GPS PROCESSOR

MGP6200™

QUALCOMM CDMA Technologies
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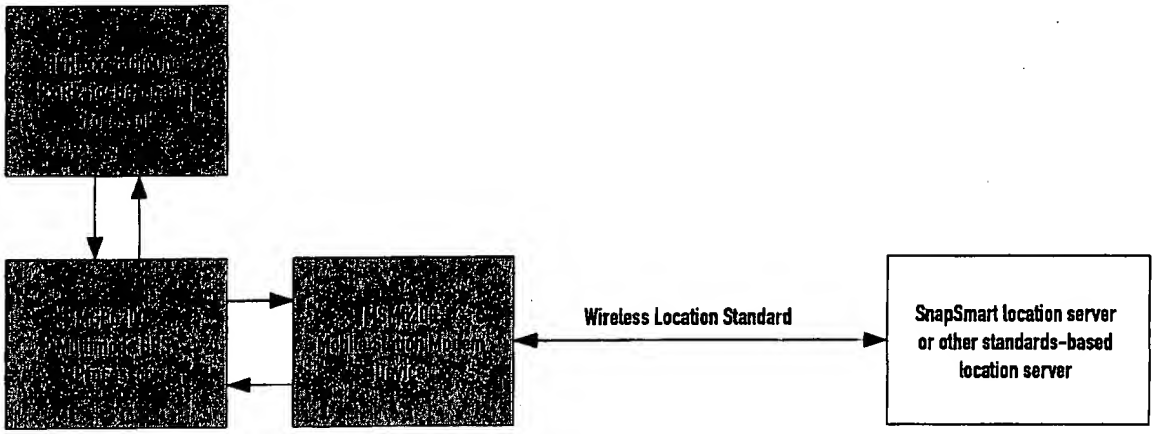
MGP6200™ QUALCOMM CDMA TECHNOLOGIES

Figure 1. MGP6200 System Solution



OVERVIEW

At QUALCOMM CDMA Technologies (QCT), we strive to constantly improve the indispensable communication tools we all use every day. QCT creates state-of-the-art chipsets, system software, development tools and products — such as the Wireless Internet Launchpad™ suite of technologies and software — that support the most advanced digital wireless features and functionality available for wireless devices and base stations — while continually reducing complexity, cost and board-space requirements.

QCT's MGP6200™ (Multimode GPS Processor) chipset is optimized for the QUALCOMM MSM6200™ Mobile Station Modem (MSM™) solutions to enable Assisted GPS (AGPS) operation and standalone GPS operation. The MGP6200 chip supports AGPS-based location applications on GSM, GPRS and WCDMA (UMTS), and offers three standards-supported modes of AGPS operation (mobile-assisted, mobile-based and standalone), which are optimized to address different application requirements. The MGP6200 chip provides the performance necessary for the demands of value-added position location services and mobile e-commerce/wireless Internet applications markets world-wide.

The position location capability enabled by the MGP6200 solution can be accessed via QUALCOMM's Wireless Internet Launchpad suite. The position location API component of the Wireless Internet Launchpad suite provides applications with easy access to location information and control over their operation. The MGP6200 chip leverages SnapTrack's proven AGPS algorithms for multipath mitigation, power reduction, sensitivity enhancement and minimized wireless bandwidth utilization. These leading-edge algorithms, combined with the high level of integration, provide unmatched GPS acquisition speed, accuracy and sensitivity, while minimizing handset cost and space requirements, minimizing handset battery usage and reducing communications bandwidth in every air interface.

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MGP6200™

MGP6200™ QUALCOMM CDMA TECHNOLOGIES

ADVANCED SYSTEM LEVEL SOLUTION

The MGP6200 solution provides compelling advantages over other location technologies:

- Low-cost implementation makes AGPS the most cost-effective location solution for widespread high-accuracy, location-based service deployments.
- Operates in an optimized, end-to-end system featuring 100 percent compatibility with SnapSmart™ location server software.
- Wireless assisted capability means all-terrain location information is available quickly and reliably — outdoors, indoors, and in severely blocked environments.
- Three different modes of operation, ranging from full-featured mobile-assisted to unassisted standalone operation, enable the MGP6200 chip to optimize the location solution at the system level for the application.
- Pattern match and other advanced time maintenance algorithms provide crisp AGPS operation in asynchronous networks.

GSM/GPRS/WCDMA AIR INTERFACE SUPPORT

- The MGP6200 solution supports location applications on GSM, GPRS and WCDMA (UMTS), and supports seamless roaming across diverse service areas. It does not require costly network equipment, such as location measurement units (LMUs), to operate effectively.
- Compatibility with location standards ensures support in standards-based wireless location services on a worldwide basis with a standards-compliant location server like the SnapSmart location server.

SUPERIOR PERFORMANCE FEATURES

- Optimized for integration with the QUALCOMM MSM6200 device to enable high-accuracy location-based services.
- Loopless tracking enhances reliability, especially in fluctuating GPS signal environments.
- "Link-aware" operation utilizes time and frequency information from the wireless network to help speed GPS measurements.
- The MGP6200 chip seamlessly switches between modes to utilize available aiding information.
- Fault detection and cross-correlation detection improve accuracy and reliability, and eliminate bad position information to provide typical accuracy in the 5 to 10 meter range.
- Fast convolution processing techniques provide industry-leading start time and sensitivity in assisted and unassisted modes.
- Typical cold start sensitivity at –152 dBm means cold-start operation indoors and in other blocked environments in seconds.

MULTIMODE GPS PROCESSOR

MODES OF OPERATION

- **Mobile-Assisted (Smart Server)** The MGP6200 chip uses aiding data from the location server to quickly make GPS measurements and send them to the location server for final processing and location determination. This mode offers optimum start time, sensitivity, and accuracy, and is typically used for applications where periodic position reports are used by network-based entities.
- **Mobile-Based (Thin Server)** The MGP6200 chip uses aiding data from the location server to quickly acquire GPS satellites, generate measurements, and calculate the location information (performed by the MGP6200 chip rather than by the location server). This mode offers optimized start time and sensitivity, and is typically used for applications requiring continuous position reports in the handset.
- **Standalone (Autonomous)** The MGP6200 chip ooperates as a standalone GPS receiver (demodulates data bits directly from the GPS satellites). In this mode, the MGP6200 solution provides sensitivity and start-time performance superior to conventional GPS, but with slower start times and less initial sensitivity than the assisted modes. The MGP6200 chip seamlessly transitions between mobile-assisted and mobile-based modes of operation. This mode is typically used for applications where no assistance data is available from the wireless network, or the user is completely out of coverage from the wireless network.

MGP6200 SPECIFICATIONS AND INTERFACES

- 2.5v to 3.0v digital voltage
- 2.5v to 2.7v ADC voltage
- μBGA Package, 10mm x 10 mm [(121 pins (0.8mm spacing)])
- The MGP6200 chip communicates with the MSM6200 devices via an optimized interface.
- Location information and control can be easily accessed via the position location API component of QUALCOMM's Wireless Internet Launchpad.
- Data content is compatible with wireless communication standards.

MULTIMODE GPS PROCESSOR

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Enabling the future of communications.

MGP6200™
QUALCOMM CDMA TECHNOLOGIES

QCT'S COMMITTMENT TO CUSTOMER SUPPORT

As with all QCT products, the MGP6200 solution features the unparalleled customer support you have come to expect from your partner of choice for complete wireless communications solutions. QCT is committed to providing innovative multimode, multi-network chipsets, system software and development tools that will help ensure your competitive success in the wireless communications marketplace for 3G and beyond.

SnapTrack
A QUALCOMM COMPANY

Printed in USA 1/2002 MGP6200-SS X1umts

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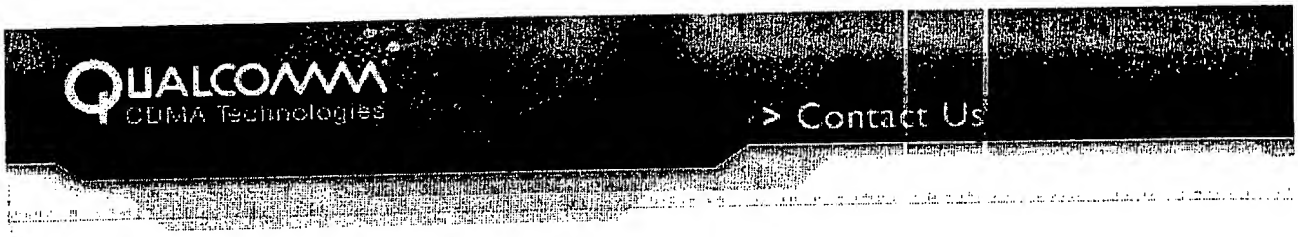

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Export Compliance/Customs Information by Product and ISO 9001 Certificate

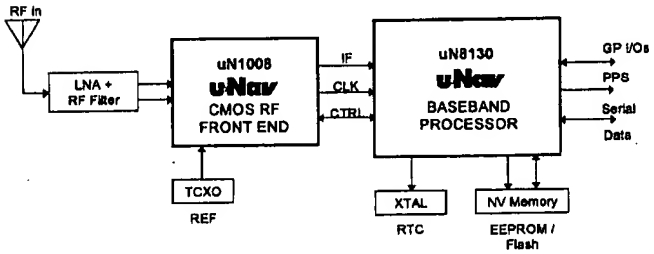
uN9x18

Low Power, High Performance GPS Receiver Chipset

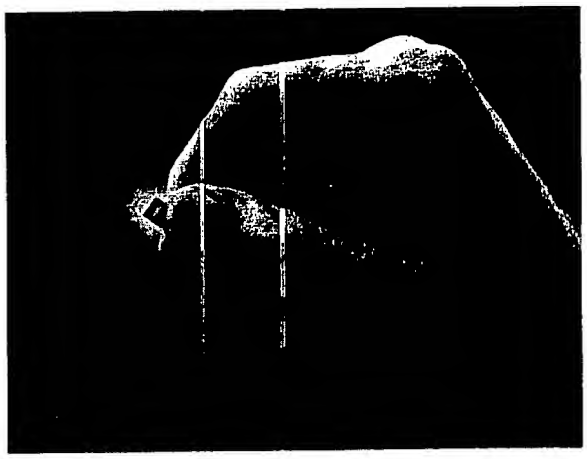
microelectronics

PRODUCT FEATURES

- Low cost 12-channel GPS receiver chipset featuring the uN1008 RFIC and the uN8130 BBIC
- Ultra-low chipset power consumes less than 55mW during continuous GPS tracking at 1Hz rate
- High sensitivity receiver capable of A-GPS (IS-801 and 3GPP) acquisition as low as -151dBm within 16 seconds
- On-chip frequency synthesizer supports CDMA, GSM, and multiple GPS reference frequencies
- Orion navigation software package with development kit (SDK) allows product customization
- Extremely small size – available in CSP, BGA and QFN package options
- Available with integrated 8Mbit flash (uN2110 BBIC) and complete RF path (uN1510 RF)



uN9018 GPS Receiver System Block Diagram



Advance GPS Navigation Solution

The u-Nav microelectronics uN9x18 is a complete CMOS GPS Receiver chipset solution. It features the uN1008, u-Nav's next generation ultra-low power RF Front-End and the uN8130, a highly integrated Baseband Processor that utilizes the power efficient VS_DSP processor core.

The uN8130 includes a state-of-the-art search engine with fast satellite acquisition based on u-Nav's QwikLock™ technology.

An array of twelve independent tracking correlators employing u-Nav's Zoom Correlator™ technology insure positioning even in severe conditions such as in urban canyons and under foliage.

The high level of integration, advance circuit design techniques, and innovative packaging minimizes external components and allows the uN9018 GPS Receiver system to be implemented in a surface mount component as small as 10x10x1.8mm.

Product Brief
Doc. No. 901801

July 21, 2006

uN9x18 GPS Receiver Solution

TECHNICAL SPECIFICATIONS

General	
Tracking	L1 (1.57542 GHz)
Channels	12
Chipset Power	
Sleep Mode	20 µW
Tracking Mode	55 mW
Acquisition Mode	70 mW
Sensitivity	
AGPS Acquisition (<16 sec.)	-151 dBm
GPS Acquisition	-140 dBm
Navigation	-148 dBm
Tracking	< -150 dBm
Accuracy	
Horizontal Position	3 m (CEP)
Velocity	0.2 m/s (50%)
Time To First Fix (TTFF)	
Quick Start / Re-acquisition	< 2 sec
Hot Start	8 sec
Warm Start	35 sec
Cold Start	45 sec
Voltage	
RF, Baseband	1.8 V
I / O	1.8 V or 3 V

All chipset power measured at 1.8V.

ORION NAVIGATION SOFTWARE

The uN9x18 GPS solution utilizes the Orion navigation software, which drives GPS functions such as signal acquisition, tracking, data extraction, and GPS navigation.

The uN9x18 chipset provides the following software options:

- Conventional GPS: Full navigation software for autonomous GPS operation
- Assisted Conventional GPS: Full navigation software that utilizes assistance data to improve TTFF, sensitivity and accuracy
- Single Fix A-GPS: High sensitivity network assisted operation that produces a single position fix for IS-801 cellular systems
- Multi-Mode: Single GPS software package that supports conventional, assisted conventional and Single Fix modes

The navigation software is delivered in binary code format. The integration of user tasks and customization of software modules, including AGPS protocol, are supported through Software Development Kits (SDK). The uN9x18 SDK includes training, documentation, software, examples, and reference design hardware.

CHIPSET OPTIONS

Chipset	RFIC	BBIC	Description	Chipset Area
uN9018	uN1008	uN8130	Standard chipset	65 mm^2
uN9118	uN1008	uN2110	Includes integrated stacked-flash (8Mbit)	89 mm^2
uN9518	uN1510	uN8130	uN1510 includes full RF path (LNA, SAW, matching)	84 mm^2
uN9618	uN1510	uN2110	Requires only the TCXO and RTC crystal	108 mm^2

For product availability and additional information, please contact your local u-Nav representative, or visit us at www.unav-micro.com. Corporate Headquarters telephone: +1(949)453-2727

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Orion™ GPS Software

u-Nav microelectronics

OVERVIEW

The u-Nav microelectronics' OrionTM software is a powerful and versatile Multi-Mode GPS navigation software designed to support the u-Nav uN9018 GPS Receiver chipset solution across multiple frequency plans (see Table1).

Reference (MHz)	Application
13.0	GSM
16.3574	Standard
16.3676	Standard
19.2	CDMA
26.0	GSM
32.7452	Standard

Table 1: Orion Frequency Plans

The software is responsible for all GPS functions such as signal acquisition, tracking, data extraction, and GPS navigation. The navigation data is transferred from the

u-Nav Baseband processor using proprietary u-Nav Binary Protocol (UBP) or NMEA messages over UART serial interfaces. The application software can communicate back to the navigation software using NMEA or the UBP.

An Orion Software Development Kit (SDK) is also available, providing developers the freedom to customize and add functional blocks to meet application specific requirements.

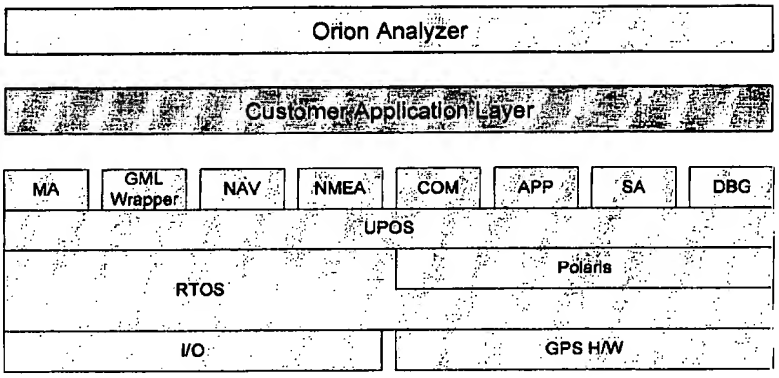
Features and Performance

- Multi-Mode GPS software supports:
- Autonomous GPS
  Assisted conventional
  A-GPS Single Fix (3GPP, 3GPP2, IS-801, TIA-916)
- High sensitivity solution capable of:
  Autonomous data decoding below -142dBm
  Tracking at -151dBm
- Modular software architecture easily integrates into existing systems
- Software Development Kit (SDK) provides flexibility for software customization

Accuracy	
Position (2DRMS)	<3 m
Velocity (RMS)	0.2m/s
TTFF	
Fast Start	3 sec
Hot Start	8 sec
Cold Start	42 sec
SENSITIVITY*	
Single Fix A-GPS	-151 dBm
Cold Start Acquisition	-140 dBm
Tracking	-151 dBm

Specified at input of the receiver

ORION SOFTWARE STACK



MULTI-MODE GPS NAVIGATION

Orion software supports autonomous conventional, assisted conventional, and Single-Fix AGPS modes. In autonomous conventional mode, the Orion software computes the receiver's current position utilizing measured pseudo-ranges, satellite ephemeris, clock correction, GPS time, and the receiver's last known position.

In assisted conventional and Single-Fix A-GPS modes, the Orion software utilizes externally provided assistance data to reduce Time to First Fix (TTFF), improve initial position accuracy, and increase sensitivity. Actual performance will depend on the quality of the external assistance data provided. For 3GPP, 3GPP2, and IS-801 compliant assistance data, the Orion software exceeds the specified performance requirements for each of those standards.

SATELLITE ACQUISITION AND TRACKING

The OrionTM navigation software features the u-Nav GPS Measurement Layer (GML™) that interfaces to the u-Nav baseband and RFIC hardware.

The GML acquisition algorithms efficiently scan GPS signals by utilizing the u-Nav QwikLock™ search engine, which simultaneously searches up to four frequency bins to improve initial satellite search time with no aiding information.

The GML tracking loop manages an array of twelve independent tracking channels and quickly adapts to changes in signal strength and other dynamic conditions found in harsh urban canyons.

WAAS / EGNOS

Orion supports WAAS and EGNOS signal tracking and message decoding. The message data provides satellite integrity information and correction for signal propagation delays due to the ionosphere, as well as corrections for GPS satellite orbit and clock drift. The ionosphere correction data improves the precision of the measured pseudoranges in the navigation layer, and the satellite integrity information is taken into account by the Orion navigation core while computing the position and the accuracy of the satellite signals.

SOFTWARE ARCHITECTURE

The architecture of the Orion software (Figure 1) is based on an information flow model that consists of message exchange between individual subsystems. Each subsystem has a standard interface and contains at least one task. It can also include function libraries and interrupt handlers. The description of Orion subsystems is shown in Table 2.

The subsystem can only send and receive messages to other subsystems and the embedded RTOS through a centralized Messaging Agent (MA). The MA forwards the messages to the subsystem and provides valid and up-to-date information to all subsystems based on subscription or on demand by other subsystems.

Standard Subsystem - The Orion software architecture (Figure 1) is comprised of standard subsystems that are used in both conventional and assisted GPS navigation modes. The descriptions of the modules are listed in Table 1.

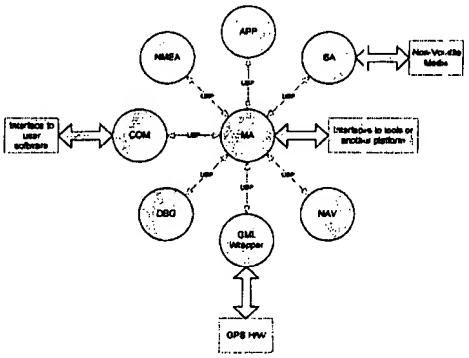


Figure 1: Orion System Architecture

APPLICATION PROFILE CONFIGURATION

The Orion software allows the user to send UBP or NMEA Application Profile commands that sets, stores, and retrieves receiver configuration information in the system. The Application Profile simplifies steps needed to configure and control the receiver features and navigation parameters.

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Subsystem Module	Description
COM	Output navigation information and handles all communication between the HOST and Orion. This module handles NMEA formatted data from the NMEA subsystem, UBP data received from the NAV subsystem, and AGPS protocol data received from the AGPS subsystem.
NAV	Responsible for all calculations required to produce navigation fixes. The NAV subsystem can use external assist data from the AA or RAIM subsystem for better accuracy. The NAV produces Doppler estimates for GML, ephemeris and almanac data to SA for storage and later use, and assistance data (PVT) for the AA module.
GML	Produces measured code phases and Doppler to NAV subsystem and inputs aiding data from AA and Doppler estimates from NAV.
Time Agent (TA)	Manages both time (GPS time, UTC time) and timing related actions. TA is aware of available timing resources, including timing assistance.
NMEA	Convert message strings between u-Nav binary protocol and NMEA standard ASCII protocol.
Application Profile (APP PROF)	Handles application dependent parameters and distributes to other subsystem. Possible pre-defined profiles could be: vehicle use, pedestrian use, indoor use
Storage Agent (SA)	Responsible for storing and retrieving information considered non-volatile. The SA subsystem is aware of available storage subsystems, and hides media-specifics from the users.
DBG	Handles debugging-related messages. Features include: - Execution time profiler - Direct memory access - Stack usage reporting

Table 2: Orion Subsystem Descriptions

Command Type	Description
Communication	Defines communication protocol, UART port selection, message interval, port speed, message mask
Control	Issues Stop and Start commands and Sleep modes. Start navigation options are: - AUTO_START - COLD_START - WARM_START - HOT_START
Datum	Selects datum, configures offset from default datum (WGS84)
User Customization	Sets time zone
Debugger	Customizes interval for sending debug messages
Version (Read only)	Version of Orion software and u-Nav GPS hardware
Master Clock (Read Only)	Current frequency plan

Table 3: Application Profile Command Type

Additional information of the Application Profile features and commands can be found in the u-Nav Orion User's Manual.

NMEA Messages

Orion produces messages in accordance with NMEA 0183 v3.01 standard (http://www.nmea.org). The NMEA message data consist of ASCII characters based on the following format:

$GP<message id>,<data field>,<data field>,,,
..*<checksum><CR><LF>

The Orion software supports the NMEA messages listed in Table 4.

Message ID	Description
GGA	GPS fix data
GLL	Geographic position, longitude and latitude
GSA	DOP and active satellites
GSV	Satellites in view
RMC	Recommended minimum specific GNSS Data
VTG	Course over ground and ground speed
ZDA DTM	Time and date

Table 4: Orion™ NMEA Message Description

NMEA Commands

In addition to the NMEA messages listed in Table 4, u-Nav utilizes custom NMEA data and command messages based on the following format:

$PUNV, <command>,<data field>,<data field>,,,
*<checksum> <CR><LF>

Detail information of the NMEA messages and commands can be found in the u-Nav Orion NMEA User Manual document.

UBP PROTOCOL

The Orion u-Nav Binary Protocol (UBP) is used to communicate with external devices as well as internal communication between subsystem modules.

Table 5 provides examples of UBP messages types used in the Orion software. Detailed information of the protocol can be found in the u-Nav Proprietary Binary Protocol specification document.

UBP Message	Function
Registration	Registration of the module with the Messaging Agent. Normally used in the start up of system.
Data	GPS tracking status, satellite information, and navigation data.
Assistance	Assistance data.
Command	Start and Stop navigation commands sent by host. Start navigation options are: - AUTO_START - COLD_START - WARM_START - HOT_START
Request	Request a data that is not in subscription list.
Routing	Defines message ID to be rerouted.
Debug	Messages relating to debug features (see DBG system module description in Table 5).

Table 5: Orion UBP Message Types

SOFTWARE PORTABILITY

The Orion architecture supports software porting of non-hardware specific subsystems to other processors with ease. Orion distributed mode, also known as host mode, allows the division of the non-hardware specific subsystems to work in a separate host environment. Separate MA's, which is independent of the application, can exist in both the embedded and host Operating Systems (OS) to manage the messaging tasks of the local subsystem modules.

A Portable RTOS (UPOS) resides in both processors in a distributed system and provides a message and API abstraction layer to the VS_DSP RTOS. This allows location of modules in one OS to be transparent to modules running in the other OS.

All of the software application code will execute on top of the UPOS and use it for RTOS features such as message queues and threading operations. Direct access to the VS_DSPTM RTOS features is not required, which reduces the complexity of migrating and developing software components on different processor environment.

SOFTWARE DEVELOPMENT KIT

A complete software development kit (SDK) is available for the Orion navigation software package. The Orion SDK allows users to add, modify, or remove individual subsystems in order to customize the software for specific applications.

The Orion SDK includes sample source code and development tools to add and initialize logical units, and customize messages between logical units. It includes debug features providing direct read/write memory access on embedded side and execution time (CPU usage) profile information.

The SDK tool set includes the Orion Workbench utility which allows development and debugging of subsystems in Windows® host environment; and an easily modifiable compilation environment (Optimizing C Compiler, profiler, linker, debugger) with u-Nav Vega™ and Microsoft® Visual Studio®.

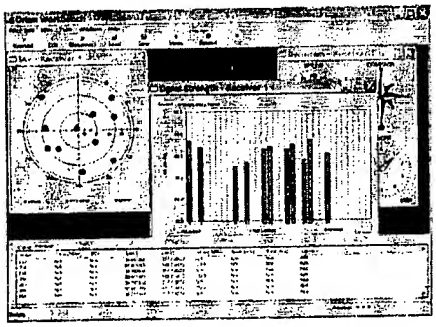

Figure 2: Orion Workbench

FEATURES OF THE ORION SDK

The standard Orion SDK supports the following features and capabilities:

Message Management – The SDK allows users to create and edit communication messages in either the NMEA or UBP format. The User can edit existing NMEA messages and/or create new ones. SDK Users can also set both NMEA and UBP message masks at compile time.

I/O Control – u-Nav GPS chipsets include a variety of user programmable peripherals including general purpose I/O (GPIO), timers, counters, PWM, ADC, and PMU. The SDK allows users to configure and manage these I/O resources as required by a given application.

Subsystem Creation – The SDK allows users to create and add new subsystems to the Orion software.

Flash Memory Support – The SDK allows the User to do a number of modifications related to flash memory devices. In addition to the flash devices supported by the standard Orion software, the SDK allows users to modify the software to support new flash devices. The SDK also allows users to select or customize the size of the flash file system; and read/write application data to the flash device.

Data Editing – The User can edit position, velocity, and time information prior to sending it out (in NMEA subsystem.)

Change the external-RTC driver to support a different external-RTC device

Application Profile – The SDK allows the User to create change configuration of the software to create a custom application profile.

Compiling – The SDK allows the User to compile/build a binary for any supported combination of compile-time options such as frequency plan, RF device type, Flash device type etc.

APPLICATION EXAMPLE 1: SPEED CAMERA DETECTOR

In some countries, speed cameras are distributed throughout cities (common in Korea and Japan) and when a motorist exceeds the speed limit a photograph is taken and a ticket is issued through the mail. The speed cameras are in fixed known locations so it is possible to use GPS to warn a motorist when they are in the vicinity of a speed camera.

Using the SDK, a customer can modify the standard Orion software to specifically support this speed camera detector application. The main areas of modification fall into these categories:

- Read/Write access to non-volatile data storage
- Creating/modifying commands
- Ability to add event-driven algorithms
- User notification of events via peripherals (GPIO, SPI, UART, etc.)

Non-volatile Data Storage – For this application,

the camera location database will be programmed into flash at production time. During the lifetime of the application, elements of that database may need to be deleted, modified and/or appended. The SDK is used to create the subsystem that manages and controls the maintenance of the database in the application flash. In addition, configuration settings of the application may also require modification and storage to flash.

Creating/Modifying Commands - The SDK is also used to extend the NMEA and/or UBP interface to include additional read and write commands. Such commands will include configurations commands sent to the receiver, downloading of large binary or ASCII files to and from the receiver and event notification commands via the UART from the receiver to the end user.

Event-Driven algorithms - The application may use the GPS processor to algorithms to compare the current position with positions in the database. The algorithms run at regular intervals based on a new fix or a timer interrupt. The algorithms will include high speed search of the database and range calculations to the current position.

User Notification - The application will notify the end user when the current position is within a preconfigured range of a stored position. The SDK can be used to program I/O to enable LED's, alarms, synthesized speech, or text messages; as well as sending a message via the SPI port and/or UART.

APPLICATION EXAMPLE 2: POSITION PINNING

In many applications, the position and/or velocity is represented as point on a display. To make that point appear more visually stable and/or accurate to the end user, position pinning is implemented. In position pinning the reported position will not change unless some user-defined criteria are met.

Using the SDK, a customer can modify the standard Orion software to implement position pinning. The main areas of modification fall into these categories:

- Read/Write access to non-volatile data storage
- Creating/modifying commands
- Temporary storage of "fixed" position in near memory
- Position modification
- User Configuration Storage

Non-volatile Data Storage – Once the thresholds for pinning distance and velocity are determined for the application, the SDK is used to add a subsystem that stores these threshold parameters to flash. The subsystem must allocate space in the storage device and then write the parameters to the allocated space.

Creating/Modifying Commands - The SDK is used to add and/or modify commands (NMEA or UBP) to set and query the pinning parameters stored in flash, as well as a pinning enable and disable command.

Position Storage - The modified software will need to save the fixed position information in volatile memory for run-time access.

Position Modification – A task must be developed that will compare the current position against the "fixed" (or first) position. If a distance criterion is exceeded or a velocity threshold is exceeded, the new position is passed through, otherwise the command strings are created with the fixed position and the velocity is set to zero. If the any of the thresholds are exceeded, the "fixed" position is updated to the current position.

SDK PACKAGE

The Orion SDK includes two (2) development kits, two (2) power supplies, two (2) active antennae, SDK User Manual, and the SDK CD with Orion binary and source libraries.

Figure 3: Development Kit

SOFTWARE LICENSE AND SUPPORT

The Orion software and SDK is developed by u-Nav microelectronics and is available under u-Nav license. The software is delivered in binary code format, and partially in sources code for SDK usage. The SDK is supported with training, documentation, software, examples, and reference design hardware.

u-Nav Microelectronics strives to produce quality documentation and welcomes your feedback. Please send comments or suggestions to tech.pubs@unav-micro.com.

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http://www.unav-micro.com/

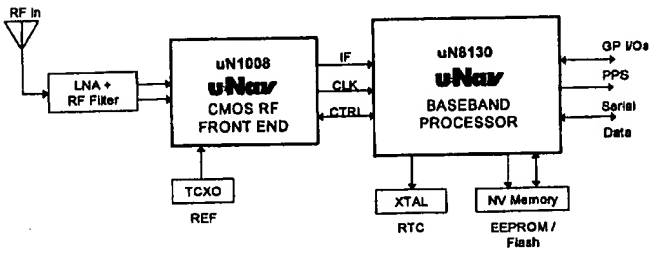
uN9x18

Low Power, High Performance GPS Receiver Chipset

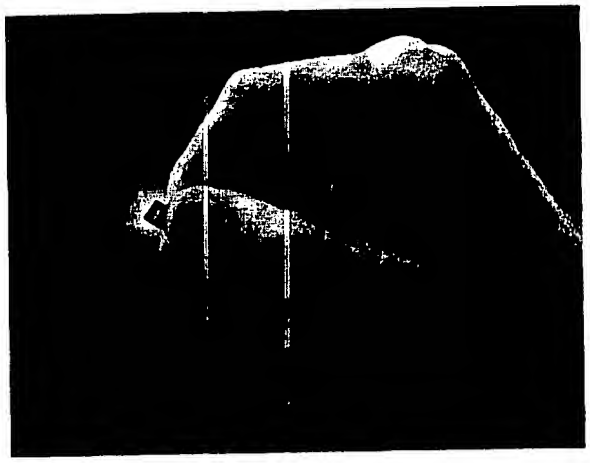
u-Nav microelectronics

PRODUCT FEATURES

- Low cost 12-channel GPS receiver chipset featuring the uN1008 RFIC and the uN8130 BBIC
- Ultra-low chipset power consumes less than 55mW during continuous GPS tracking at 1Hz rate
- High sensitivity receiver capable of A-GPS (IS-801 and 3GPP) acquisition as low as -151dBm within 16 seconds
- On-chip frequency synthesizer supports CDMA, GSM, and multiple GPS reference frequencies
- Orion navigation software package with development kit (SDK) allows product customization
- Extremely small size – available in CSP, BGA and QFN package options
- Available with integrated 8Mbit flash (uN2110 BBIC) and complete RF path (uN1510 RF)



uN9018 GPS Receiver System Block Diagram



Advance GPS Navigation Solution

The u-Nav microelectronics uN9x18 is a complete CMOS GPS Receiver chipset solution. It features the uN1008, u-Nav's next generation ultra-low power RF Front-End and the uN8130, a highly integrated Baseband Processor that utilizes the power efficient VS_DSP processor core.

The uN8130 includes a state-of-the-art search engine with fast satellite acquisition based on u-Nav's QwikLock™ technology.

An array of twelve independent tracking correlators employing u-Nav's Zoom Correlator™ technology insure positioning even in severe conditions such as in urban canyons and under foliage.

The high level of integration, advance circuit design techniques, and innovative packaging minimizes external components and allows the uN9018 GPS Receiver system to be implemented in a surface mount component as small as 10x10x1.8mm.

Product Brief
Doc. No. 901801

July 21, 2006

microelectronic

uN9x18 GPS Receiver Solution

TECHNICAL SPECIFICATIONS

General	
Tracking	L1 (1.57542 GHz)
Channels	12
Chipset Power	
Sleep Mode	20 µW
Tracking Mode	55 mW
Acquisition Mode	70 mW
Sensitivity	
AGPS Acquisition (<16 sec.)	-151 dBm
GPS Acquisition	-140 dBm
Navigation	-148 dBm
Tracking	< -150 dBm
Accuracy	
Horizontal Position	3 m (CEP)
Velocity	0.2 m/s (50%)
Time To First Fix (TTFF)	
Quick Start / Re-acquisition	< 2 sec
Hot Start	8 sec
Warm Start	35 sec
Cold Start	45 sec
Voltage	
RF, Baseband	1.8 V
I / O	1.8 V or 3 V

All chipset power measured at 1.8V.

ORION NAVIGATION SOFTWARE

The uN9x18 GPS solution utilizes the Orion navigation software, which drives GPS functions such as signal acquisition, tracking, data extraction, and GPS navigation.

The uN9x18 chipset provides the following software options:

- Conventional GPS: Full navigation software for autonomous GPS operation
- Assisted Conventional GPS: Full navigation software that utilizes assistance data to improve TTFF, sensitivity and accuracy
- Single Fix A-GPS: High sensitivity network assisted operation that produces a single position fix for IS-801 cellular systems
- Multi-Mode: Single GPS software package that supports conventional, assisted conventional and Single Fix modes

The navigation software is delivered in binary code format. The integration of user tasks and customization of software modules, including AGPS protocol, are supported through Software Development Kits (SDK). The uN9x18 SDK includes training, documentation, software, examples, and reference design hardware.

CHIPSET OPTIONS

Chipset	RFIC	BBIC	Description	Chipset Area
uN9018	uN1008	uN8130	Standard chipset	65 mm^2
uN9118	uN1008	uN2110	Includes integrated stacked-flash (8Mbit)	89 mm^2
uN9518	uN1510	uN8130	uN1510 includes full RF path (LNA, SAW, matching)	84 mm^2
uN9618	uN1510	uN2110	Requires only the TCXO and RTC crystal	108 mm^2

For product availability and additional information, please contact your local u-Nav representative, or visit us at www.unav-micro.com. Corporate Headquarters telephone: +1(949)453-2727

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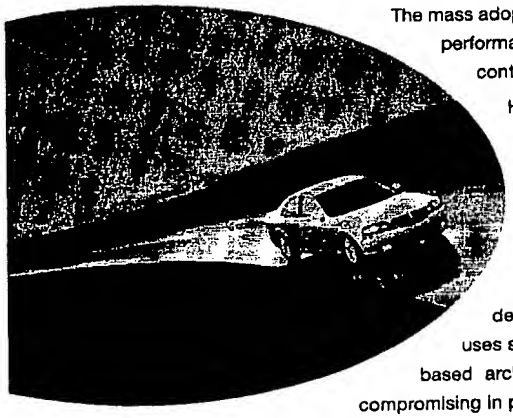
HAMMERHEAD II™

SINGLE CHIP AGPS SOLUTION

THE INDUSTRY'S HIGHEST PERFORMANCE GPS RECEIVER IN THE SMALLEST PACKAGE YET.

Hammerhead II delivers all the performance of its predecessor, Hammerhead, the world's first single chip, single die receiver, this time in a 3.5 x 3.7 x .6 mm Chip Scale Package for an even smaller PCB footprint.

Hammerhead II integrates a high performance AGPS baseband processor and a low-noise GPS RF front end. Hammerhead II comes packed with new software features such as advanced multi-path mitigation that avoid large errors in urban environments caused by reflected signal in buildings and other structures.



The mass adoption of AGPS in mobile devices sets high the bar high for a cost optimized solution delivering high performance in a super small package while drawing minimal power. Infineon and Global Locate continue to deliver industry firsts in the quest to meet the demanding requirements of mobile devices.

Hammerhead II is based on Global Locate IP and state-of-the-art Infineon RFCMOS Process Technology. This ground breaking chip is the key for enabling location-based services such as emergency assistance and personal navigation in deep urban canyons, in moving vehicles, and indoors.

Hammerhead II uses the proven host based architecture pioneered by Global Locate as the best fit for mobile devices as proven in mass market 2.5 G and 3 G devices shipping now. Global Locate host based architecture leverages some of the resources already existing in the mobile device without imposing a big CPU load (~ 3 MIPS) or any real time requirements. Hammerhead II uses standard serial communication interfaces with speeds as low as 38,400 bps. Global Locate's host based architecture yields the lowest system cost solution as well as the smallest footprint without compromising in performance.

KEY FEATURES AND BENEFITS

- Single chip solution (AGPS baseband & RF front end) minimizing board space footprint (< 50 sq mm2 PCB area for a complete AGPS solution)
- Advanced low-power RFCMOS technology with smart power management allowing power consumption of less than 30 mW in low power tracking mode for the longest battery life
- Real-time hardware correlator engine (fast acquisition and high sensitivity)
- High sensitivity, -160 dBm, enabling indoor and deep urban operation
- Built in voltage regulators supporting single power supply source
- Multiple mode operation
  - MS-based (calculation of position in mobile handset)
  - MS-assisted (calculation of position in AGPS server)
  - Autonomous (no assistance by network)
  - Enhanced autonomous (position computed at mobile device using patented, multi-day long term orbits (LTO)
- Multiple protocol operation
  - Control plane (RRLP & RRC)
  - User plane (SUPL)
- AGPS control software does not disrupt call flow and is easily integrated into cellular processor
- Standard compliant (exceeds 3GPP performance requirements for 2.5 G and 3 G networks)

THE BIGGEST NAMES USE THE SMALLEST CHIPS.

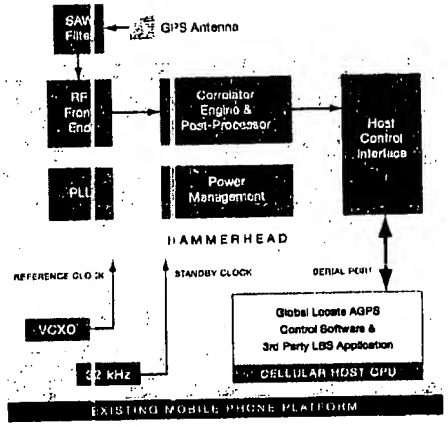
HAMMERHEAD II™

SINGLE CHIP AGPS SOLUTION

HAMMERHEAD II
SHOWN ACTUAL SIZE
@ 3.5 x 3.7 MM

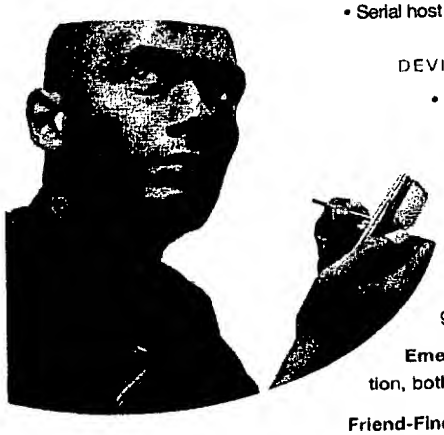
SPECIFICATIONS

- -160 dBm sensitivity
- Time-to-first-fix (mobile-based): 1 second @5 m accuracy (cold start, -130 dBm)
- 2 m steady state accuracy
- Supported reference frequencies of 10 – 40 Mhz
- Serial interface (SPI, I²C, UART)
- Assistance data standards support
  - UMTS/GSM: 3GPP TS 25.331 & TS 44.031
  - CDMA: 3GPP2 C.S0022-0-1
- 3.5 x 3.7 x .6 mm BGA package (RoHS compliance)



BLOCK DIAGRAM

- Cost optimized architecture for integration into mobile phones
- Both AGPS multi-mode control software and LBS (location based services) application executed on host CPU of cellular processor
- Serial host interface (UART, SPI or I2C)



DEVICES

- Mobile phones / Smartphones / PDAs / PNDs / Tracking

APPLICATION EXAMPLES

Personal Navigation Never get lost again in foreign cities. Your mobile phone is leading the way to your destination, whether you start indoors or outdoors.

Location Based Services Finding the way to points of interest simplifies your life. Take the short way to restaurants in your neighborhood, the nearest gas station or metro station, or play location games with your friends.

Emergency Assistance Hammerhead will enable mobile users to provide very accurate location information, both from indoors and outdoors, to emergency E911 / E112 services providers.

Friend-Finder and Child-Safety Staying in touch with friends and family is now an easy task by sharing your personal location.

For more information, please contact Global Locate at sales@globallocate.com or visit www.globallocate.com

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THE BIGGEST NAMES USE THE SMALLEST CHIPS.

Broadcom Introduces Advanced Single-Chip GPS Solution for Mobile Applications
All CMOS GPS Receiver Sets New Standards for Performance and Power Consumption FORT WORTH, Texas, ION GNSS 200
2007 /PRNewswire via COMTEX News Network/ -- All CMOS GPS Receiver Sets New Standards for Performance and Power

FORT WORTH, Texas, ION GNSS 2007, Sept. 25 /PRNewswire-FirstCall/ -- Broadcom Corporation (Nasdaq: BRCM), a globa
semiconductors for wired and wireless communications, today announced its first single-chip global positioning system (GP
the company's successful integration of its Global Locate acquisition and its commitment to delivering the industry's best G
GPS receiver sets new standards in performance and power consumption with state-of-the-art sensitivity and navigation p
than half the power consumption of competitive solutions. The new Broadcom® chip and associated software will be demo
Institute of Navigation (ION) conference in Ft. Worth, Texas beginning tomorrow.

GPS technologies have become increasingly important with growing consumer interest in personal navigation devices (PND
desire by cellular service operators to add location-based services to their offerings. According to research from In-Stat, ap
PNDs and more than 436 million mobile phones with GPS technology will ship in 2010. As GPS chip solutions become more
decline, the technology will expand into a whole new range of applications.

"As consumer use of location-based services grows, we are seeing an incredible amount of interest from our customers in
markets for GPS and assisted GPS technologies," said Scott Pomerantz, Vice President and General Manager of Broadcom's
"Broadcom has now established itself as a technology leader in the GPS chip market with a solution that provides the indus
sensitivity, lowest average power and most complete portfolio of software, complemented by the company's unique ability
technology into other leading mobile chips and processors."

The Broadcom BCM4750 is produced in a low cost 90 nanometer CMOS process and features superior receiver technology
The receiver makes full use of the Global Locate architecture, and can measure the faintest GPS signals deep indoors and i
environments at signal levels as low as -162 dBm. It also consumes less than 15 mW while navigating with one second ma
half the power of competitive solutions according to published datasheets.

The BCM4750 is ideally suited for PNDs where rapid time-to-first-fix (TTFF) and superior navigation performance are requi
products that include network connectivity, such as wireless PNDs and cellular phones, are able to exploit the full feature s
software solution. These features include Assisted GPS (AGPS) and long-term orbit (LTO) extended ephemeris assistance,
than one second in many conditions. In all cases, Broadcom provides both the chip and the software including AGPS stack

Broadcom also maintains a worldwide reference network with land-based GPS receivers located around the earth's equator
servers to collect and provide AGPS and LTO data directly to GPS equipped cellular phones and wireless PNDs. Working ha
BCM4750 and Broadcom's client software, customer products are able to take full advantage of the benefits of AGPS and L
service along with the chip, Broadcom is able to offer OEMs s a one-stop-shop for all of their positioning technology needs.

BCM4750 Product Details

The BCM4750 is a single-die CMOS GPS receiver used for tracking and navigation, primarily in mobile devices. Its massive
correlators provide faster signal searches, accurate real-time navigation. Improved tracking sensitivity and very low averag
With tracking sensitivity of -162 dBm, the BCM4750 sets a new benchmark for the industry.

Enhanced tracking sensitivity allows GPS-enabled mobile devices to detect very weak signals including those partially bloc
buildings or other structures. In these environments, GPS units sometimes fail to achieve a location "fix" or take a long tim
high sensitivity of the new BCM4750 GPS receiver chip, these initial location fixes occur much faster and in many cases, th
fix where competitors' products do not get a fix at all. The BCM4750 also integrates a number of external components, res
footprint to design GPS into mobile devices. A complete GPS solution featuring the BCM4750 will use less than 35 mm2 of
all of the necessary components for a typical cellular phone implementation.

BCM4750 Software

The BCM4750 includes software that is optimized for cellular integration and the demands of international standards bodie
SUPL -- that promote high speed data in cellular systems. The software includes message handling protocols for user and c
GPS standards, as well as native support for LTO extended ephemeris service. In addition, the software has been optimize
navigation performance and includes sophisticated algorithms to mitigate multipath errors.

About Broadcom Wireless Solutions

Broadcom is the only major chip supplier in the world with top-tier customers in Bluetooth®, WI-FI®, FM radio and GPS, fo
technologies featured in next generation mobile phones. As more consumers rely on wireless devices to stay connected, Br
the technologies that make those connections fast and reliable. With the industry's most comprehensive portfolio of wirele
Broadcom provides a "future proof" path to wireless chips that combine GPS with other portfolio technologies, producing pr

cost and in smaller form factors.

About Broadcom

Broadcom Corporation is a major technology innovator and global leader in semiconductors for wired and wireless commur products enable the delivery of voice, video, data and multimedia to and throughout the home, the office and the mobile e the industry's broadest portfolio of state-of-the-art, system-on-a-chip and software solutions to manufacturers of computir equipment, digital entertainment and broadband access products, and mobile devices. These solutions support our core mi everything®.

Broadcom is one of the world's largest fabless semiconductor companies, with 2006 revenue of $3.67 billion, and holds ov foreign patents, more than 6,600 additional pending patent applications, and one of the broadest intellectual property port wired and wireless transmission of voice, video and data. Broadcom is headquartered in Irvine, Calif., and has offices and r North America, Asia and Europe. Broadcom may be contacted at +1.949.926.5000 or at www.broadcom.com.

Safe Harbor Statement under the Private Securities Litigation Reform Act of 1995:

All statements included or incorporated by reference in this release, other than statements or characterizations of historica looking statements. These forward-looking statements are based on our current expectations, estimates and projections ab business, management's beliefs, and certain assumptions made by us, all of which are subject to change. Forward-looking be identified by words such as "anticipates," "expects," "intends," "plans," "predicts," "believes," "seeks," "estimates," "ma "would," "could," "potential," "continue," "ongoing," similar expressions, and variations or negatives of these words. These statements are not guarantees of future results and are subject to risks, uncertainties and assumptions that could cause o differ materially and adversely from those expressed in any forward-looking statement.

Important factors that may cause such a difference for Broadcom in connection with BCM4750 GPS products include, but a general economic and political conditions and specific conditions in the markets we address, including the volatility in the t semiconductor industry, trends in the broadband communications markets in various geographic regions, including season consumer products into which our products are incorporated, and possible disruption in commercial activities related to ter conflict in the United States and other locations; the rate at which our present and future customers and end-users adopt t technologies and products in the markets for global positioning system applications; delays in the adoption and acceptance in those markets; the timing, rescheduling or cancellation of significant customer orders and our ability, as well as the abil manage inventory; the gain or loss of a key customer, design win or order; our ability to scale our operations in response for our existing products and services or demand for new products requested by our customers; our ability to specify, deve complete, introduce, market and transition to volume production new products and technologies in a cost- effective and tir intellectual property disputes and customer indemnification claims and other types of litigation risk; the quality of our prod remediation costs; changes in our product or customer mix; the volume of our product sales and pricing concessions on vo effectiveness of our expense and product cost control and reduction efforts; our ability to timely and accurately predict ma evolving industry standards and to identify opportunities in new markets; problems or delays that we may face in shifting geometry process technologies and in achieving higher levels of design integration; our ability to retain, recruit and hire ke personnel and other employees in the positions and numbers, with the experience and capabilities, and at the compensatic implement our business and product plans; the risks and uncertainties associated with our international operations; compe other factors such as the qualification, availability and pricing of competing products and technologies and the resulting eff pricing of our products; the timing of customer-industry qualification and certification of our products and the risks of non- certification; the availability and pricing of third party semiconductor foundry, assembly and test capacity and raw materia manufacturing yields of our third party semiconductor foundries and other problems or delays in the fabrication, assembly, our products; the risks of producing products with new suppliers and at new fabrication and assembly facilities; the effects public health emergencies, international conflicts and other events beyond our control; the level of orders received that ca quarter; and other factors.

Our Annual Report on Form 10-K, subsequent Quarterly Reports on Form 10-Q, recent Current Reports on Form 8-K, and o Exchange Commission filings discuss the foregoing risks as well as other important risk factors that could contribute to suc otherwise affect our business, results of operations and financial condition. The forward-looking statements in this release date. We undertake no obligation to revise or update publicly any forward-looking statement for any reason.

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SnapTrack's Wireless Assisted GPS™ (A-GPS) Solution Provides the Industry's Best Location System

SnapTrack, A QUALCOMM Company

SnapTrack
A QUALCOMM Company

White Paper

As a subsidiary of QUALCOMM®, SnapTrack offers the world's most precise and flexible position location solution in the industry, and can support all wireless environments, including both synchronous and asynchronous networks, terrestrial or satellite, 800 MHz/900 MHz, 1800 MHz/1900 MHz, CDMA, WCDMA (UMTS), TDMA, PDC/PHS, GSM/GPRS, iDEN, analog and paging systems.

WHAT IT IS

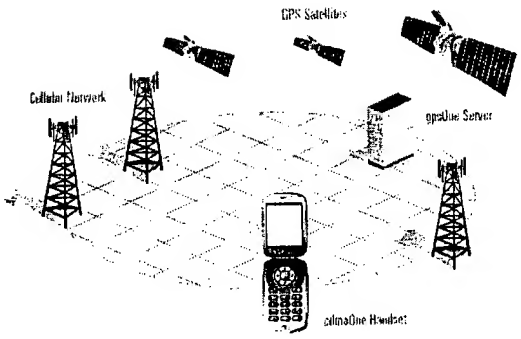
SnapTrack's commercially proven end-to-end A-GPS solution offers anytime, anywhere, accurate, high-speed location of a wireless caller. This hybrid positioning technology is the most broadly deployed precision wireless location solution available today, and is based upon SnapTrack's thin-client Wireless A-GPS system. It can easily be integrated into cellular phones, pagers, personal digital assistants and other wireless devices because it runs as software on the handset's own digital signal processing (DSP) chip or as a tightly integrated enhanced GPS capability at the baseband chip level.

While traditional GPS receivers generally take several minutes to provide a location fix, SnapTrack's system locates callers within seconds with industry leading precision and performance. Using its unique location server technology, SnapTrack overcomes traditional GPS limitations and can receive very weak, attenuated GPS indoors, and in a wide range of challenging call environments where conventional GPS solutions fail to perform. SnapTrack's Location at Hand opt-in feature ensures that subscribers stay in control of their location at all times because the feature must be activated by the customer each time a position fix is desired (with the exception of E9-1-1 emergency call location in the U.S.).

SnapTrack's products may be tightly integrated at the baseband level, such as QUALCOMM's fully integrated gpsOne A-GPS digital baseband implementation, enabling the design of wireless devices that operate in several GPS navigation modes. Modes include Mobile Station-Assisted A-GPS, Mobile Station-Based A-GPS and conventional standalone GPS, which allows out-of-network location coverage and a variety of thin-client, thin-data location applications; and combined GPS modes in a single package using a dynamic smart-location feature that enables a device to choose the appropriate location mode for a user at any given time.

SnapTrack has combined its A-GPS solution into QUALCOMM's gpsOne™ hybrid wireless location solution, delivering a robust, high-precision location capability for all air-interface standards, including CDMA, GSM/GPRS and WCDMA (UMTS). Tightly integrated at the baseband chip level, the gpsOne solution combines information from GPS and the network simultaneously, allowing for accurate GPS-based position determination when only three measurements are available. These measurements can originate from satellites and/or cell sites. This enables location coverage in the toughest conditions, allowing the gpsOne solution to work deep within steel-and-concrete structures or in towering urban street canyons.

SnapTrack's A-GPS products require no costly location measurement units (LMUs), additional cell sites, or costly modifications to existing network equipment and have little impact on handset form factor size or cost.



HOW IT WORKS

A GPS handset-based positioning method typically relies on Global Positioning System (GPS) capabilities. The GPS solution references a constellation of 24 GPS satellites that circle the earth every 12 hours. As expected, GPS-only solutions exhibit dramatically degraded performance and availability in areas where satellites are obscured, such as indoors or in major urban canyons. GPS-only solutions are also relatively slow to provide a fix and can be costly to implement. Network-based solutions rely on a signal transmitted from the mobile station (MS) to multiple fixed base stations (BSs). The network-based systems suffer from multipath, diffraction, weak signal conditions and poor cell site geometry that lead to decreased accuracy and availability.

The arrival of cellular communications systems provided a new way to combine multiple classes of measurements, resulting in much improved position location capabilities. An example is SnapTrack's hybrid A-GPS location solution, which takes advantage of the complementary nature of both network and GPS solutions by using both cellular/wireless network information and the satellite-based GPS information to directly improve the positioning availability, sensitivity, accuracy and time-to-fix. By combining the two information sources, SnapTrack's hybrid solution can provide a position fix with as few as one satellite and one cell site.

This unique solution works in the most challenging environments, even indoors, in dense urban canyons and in rural areas with limited network coverage. Because it is handset-based, the solution can be quickly and easily deployed without the expense and complexity of modifying existing equipment or adding new cell sites. By sharing processing and database functions between a mobile terminal and a centralized computer (Location Server), and by utilizing a unique signal processing architecture, SnapTrack solution provides the most accurate location information in seconds, at sensitivities hundreds of times better than conventional GPS, a cost-effective solution with accurate positioning and high service availability. In addition, this solution supports roaming, is compatible with legacy GSM networks, minimizes infrastructure costs and complies with industry location standards.

Assisted GPS: In this mode, a SnapTrack-enabled handset operates in conjunction with a location server that assists in the location calculation. The handset and location server share position information via a wireless carrier's telecommunications network. By optimally distributing the location calculation tasks, SnapTrack technology can operate easily with limited bandwidth.

When a caller makes a location request, the wireless network sends the approximate location of the handset (generally the location of the closest cell site) to the location server. The location server then tells the handset which GPS satellites should be relevant for calculating its position. The handset then takes a reading of the proper GPS signals, calculates its distance from all satellites in view and sends this information back to the location server.

SnapTrack's server software performs sophisticated error corrections and calculates the caller's latitude, longitude and altitude. In the case of 9-1-1 emergency safety calls, the server sends the information to the most appropriate public safety answering point (PSAP). For other location-based applications, the server can send the location information to a third-party service provider, mobile Internet portal or even back to the handset. The SnapTrack location determination process takes only a few seconds, while conventional GPS receivers can take several minutes.

Multimode GPS: SnapTrack's multimode technology offers additional functionality to the basic assisted GPS architecture. The multimode system can work without assistance from the wireless network. In this mode, it operates similar to conventional GPS but with dramatically increased sensitivity.

WHY IT IS THE BEST

As the pioneer of Wireless A-GPS technology, SnapTrack has become the driving force behind the expansion of the complex location-based services (LBS) marketplace. Superior technology, a strong patent portfolio, extensive commercial deployment experience, and client and server products make SnapTrack central to the entire LBS ecosystem. No company can offer the complete end-to-end solution that SnapTrack can. With its expertise, real experience, and commitment to promoting A-GPS technology, SnapTrack fosters and helps companies commercialize innovative LBS applications and services.